SHRI VIDHYABHARATHI MATRIC HR.SEC.SCHOOL

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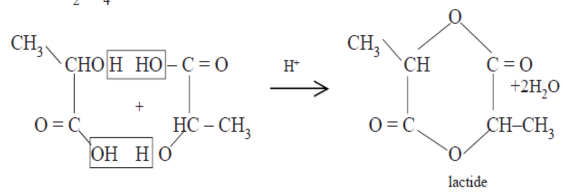
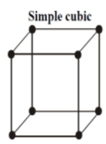
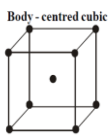
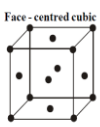
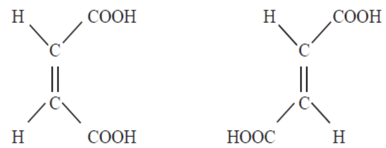
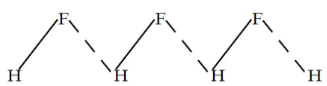
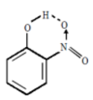
COMMON HALF-YEARLY EXAMINATION 2018

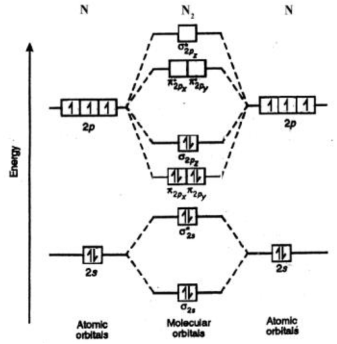
STD: XII **22.12.2018**

SUBJECT: CHEMISTRY **ANSWER KEY** **MARKS : 70**

Q.NO	SECTION-I	MARKS
1	c) β- particle	1
2	a) Hydride	1
3	c) -2 to 0	1
4	b) +3	1
5	d) I,II andIV	1
6	a) A_1B_4	1
7	a) Sec^{-1}	1
8	a) Solid dispersed in gas	1
9	b) Phenolphthalien	1
10	d) $nE^0 = 0.0591 \log K$	1
11	c) 2-pentanol	1
12	a) Functional isomerism	1
13	d) (ii),(iii),iv),(i)	1
14	c) $CH_3CH_2COOH<CH_3COOH<HCOOH<ClCH_2COOH$	1
15	C) Tri	1
Q.NO	**SECTION-II**	**MARKS**
16	The reason for this is probablydue to i)small size of fluorine atom. ii) The addition of an extra electron produces high electron density which increases strong electron-electron repulsion.	1 1
17	**Ligand:** NH_3(Ammine), Cl^-- Chloro **Central metal ion:** Co^{+3} **Co-ordination number:** 6 **Nature of the complex:** cationic complex	Each one has ½
18	${}_7N^{15}$ (p,α) ${}_6C^{12}$ ${}_{11}Na^{23}$(n, β)${}_{12}$ Mg^{24}	1 1
19	If a system at equilibrium is subjected to a disturbance or stress, then the equilibrium shifts in the direction that tends to nullify the effect of the disturbance or stress	2
20	Lyophilic-Gelatin , protein, starch Lyophobic- Sulphur	1 1
21	When the emf of a cell is determined under standard conditions, it is called the standard emf Thus standard emf may be defined as the emf of a cell with 1 M solutions of reactants and products in solution measured at 25° C.	2
22	Increasing order of reactivity :$HCHO>CH_3CHO>CH_3COCH_3$ Reason:+I Effect	2

23	Formation of cyclic diester - by heating in presence of catalytic amount of con. H_2SO_4. 	2
24	❖ Phospholipids like lecithins, and cephalins play a greater role in biosystem. ❖ The lecithins are required for normal transport and utilisation of other lipids, especially in the liver. lecithin aids in the organisation of the cell structure. Cephalins are found in the brain. **Cephalins** have been implicated in the process of blood coagulation.	1 1
Q.NO	**SECTION-III**	**MARK**
25	Lead is not attacked by pure water in the absence of air, but water containing dissolved air has a solvent action on it due to the formation of **lead hydroxide (a poisonous substance).** This phenomenon is called **Plumbo solvency**. $2Pb + O_2 + 2H_2O \longrightarrow 2Pb(OH)_2$	1 1 1
26	**Any three Points** 1.A pyrophoric alloy which contains cerium, lanthanum and Neodymium, iron,aluminium, calcium, carbon and silicon is used in cigarette lighters, toys, flame throwing tanks and tracer bullets. 2. Ceria (CeO_2) and thoria (ThO_2) are used in gas lamp materials. 3.Cerium salts are used in dyeing cotton, lead storage batteries and as catalyst. 4. Lanthanides are used in metallothermic reactions due to their extraordinary reducing property. Lanthanido - thermic processes can yield sufficiently pure Nb, Zr, Fe, Co, Ni, Mn, Y, W, U, B and Si. 5. Alloys of Lanthanides are known as mish - metals .The major constituents of mish-metals are Ce(45-50%), La(25%), Nd(5%) and small quantities of other lanthanide metals and Fe and Ca impurities. Mish-metals are used for the production of brands of steel like heat resistant, stainless and instrumental steels. Mg- alloys containing 30% mishmetal and 1% Zr are useful in making parts of jet engines.	3
27	Coordination compounds having the same molecular formula but forming different ions in solution are called ionisation isomers. This property is known as ionisation isomerism. An example of this type of isomerism is furnished by the red-violet, $[Co(NH_3)_5Br]SO_4$ $[Co(NH_3)_5SO_4]Br$ pentaamminebromocobalt(III) sulphate pentaamminesulphatocobalt (III) bromide The red-violet isomer yields sulphate ion and the red isomer furnishes bromide ion in solution.	1 ½ 1 ½
28	 The total Number of atoms per unit cell = Nc/8=8/8= 1	1
	 The total Number of atoms per unit cell = Nc/8 +Nb/1 =8/8 + 1/1 = 1+1 = 2	1
	 The total Number of atoms per unit cell = Nc/8+Nf/2 = 8/8 + 6/2 = 1+3 = 4	1

29	**a) bromination of bromo benzene**- Parallel reaction **b) Decomposition of HI in gaseous phase** - Opposing reaction **c) Hydrolysis of diester in the presence of base** - Consecutive reaction	1 1 1
30	**Any three points** ❖ The catalyst remains unchanged in mass and in chemical composition at the end of the reaction. ❖ Only a small quantity of catalyst is generally needed. ❖ A catalyst cannot initiate a reaction. The function of a catalyst is only to alter the speed of the reaction which is already occurring at a particular rate. ❖ A catalyst does not alter the position of equilibrium in a reversible reaction. ❖ The catalyst is generally specific in its action.	3
31	*Cis* [Maleic acid] *Trans* [Fumaric acid] fumaric acid(trans) is more stable than Maleic acid(cis) because of steric hindrance	1½ 1½
32	**C_6H_5CHO** : phenyl methanal **$C_6H_5CH=CH-CHO$** : 3-phenyl prop - 2 en- 1- al **$CH_3COCH_2CH=CH_2$:** Pent - 4-ene - 2-one	1 1 1
33	❖ Aqueous solution of carboxylic acids **turn blue litmus into red colour.** ❖ Carboxylic acids give **brisk effervescence** with sodium bi-carbonate due to the evolution of carbon-di-oxide. ❖ On warming carboxylic acids with alcohol and concentrated sulphuric acid it forms ester which is identified from its **fruity odour.**	1 1 1
Q.NO	**SECTION-IV**	**MARKS**
34	a) i) **Intermolecular hydrogen bonding.**  **Hydrogen fluoride, H - F.** **Intramolecular hydrogen bonding.**  **O-Nitrophenol**	½ + ½ ½ + ½
	ii) Electronic configuration of Nitrogen - $1s^2 2s^2 2p^3$ N_2 molecule - 14 electrons $N_2 : KK(\sigma_{2s})^2(\sigma^*_{2s})^2(\pi_{2p_x})^2(\pi_{2p_y})^2(\sigma_{2p_z})^2$ here KK : $(\sigma_{1s})^2(\sigma^*_{1s})^2$	½ ½



1

$$\text{Bond order} = \frac{N_b - N_a}{2} = \frac{8-2}{2} = 3.$$ ½

nature of the bond : Triple ½

magnetic : Dia magnetic

b) i)As we move from **left to right** across a period, there is regular **decrease in atomic and ionic radii** of the elements. This is due to the **increase in the nuclear charge** and the additive electrons are added to the same electronic level. 1

On moving **down a group both atomic and ionic radii increase** with increasing atomic number. The **increase in size is due to introduction of extra energy shells** which outweigh the effect of increased nuclear charge. 1

ii) The electronic configuration of K atom is 1

$K_{19} = (1s^2)\ (2s^2\ 2p^6)\ (3s^2\ 3p^6)\ 4s^1$

Effective nuclear charge $(Z_*) = Z - S$ 1

$Z_* = 19 - [(0.85 \cdot \text{No. of electrons in } (n-1)_{th} \text{ shell}) +$

$(1.00 \text{ total number of electrons in the inner shells})]$

$= 19 - [0.85 \cdot (8) + (1.00 \cdot 10)]$ 1

$Z_* = 2.20$

35

a) ore :The chief ore Argentite (Ag_2S) ½

Concentration: ore is concentrated by froth-floatation process. ½

Treatment of the ore with NaCN

$$Ag_2S + 4NaCN \rightleftharpoons \underset{\text{Sodium argento cyanide (soluble)}}{2Na[Ag(CN)_2]} + Na_2S$$ 1

Precipitation of silver

$$2Na[Ag(CN)_2] + Zn \rightarrow Na_2[Zn(CN)_4] + 2Ag\downarrow$$ 1

Electrolytic refining 2

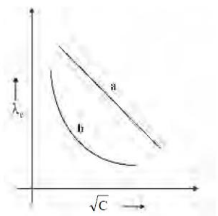
Anode : impure silver

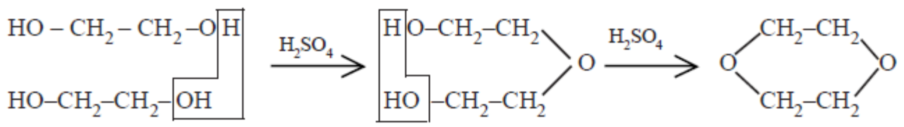
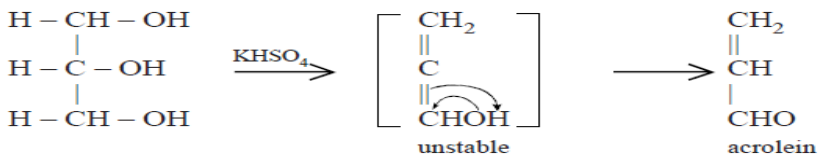
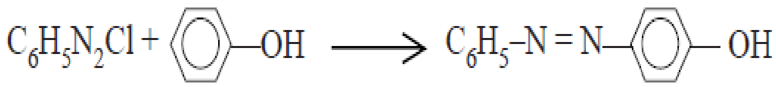
Cathode: Pure silver

Electrolyte: Silver nitrate & 1% Nitric acid

b) (i) any three points 3

	Chemical reactions		Nuclear reactions
1.	These reaction involve some loss, gain or overlap of outer orbital electrons of the reactant atoms.	1.	Nuclear reactions involve emission of alpha, beta and gamma particles from the nucleus.
2.	A chemical reaction is balanced in terms of mass only	2.	Nuclear reaction is balanced in terms of both mass and energy.
3.	The energy changes in any chemical reaction is very much less when compared with nuclear reaction.	3.	The energy changes are far exceed than the energy changes in chemical reactions.
4.	In chemical reactions, the energy is expressed in terms of kilojoules per mole.	4.	In nuclear reactions, the energy involved is expressed in MeV (Million electron volts) per individual nucleus.
5.	No new element is produced since nucleus is unaffected.	5.	New element / isotope may be produced during the nuclear reaction.

	(ii) The amount of energy absorbed or released during nuclear reaction is called Q-value of nuclear reaction. $Q_{value} = (m_p - m_r)$ 931 MeV where m_r - Sum of the masses of reactants m_p - Sum of the masses of products	1 1
	a)(i) In a chemical reaction, when **number of molecules of products are more than the number of molecules of reactant** entropy increases. b) In physical process, when a **solid changes to liquid, when a liquid changes to vapour and when a solid changes to vapour**, entropy increase in all these processes.	1 1
36	**(ii) Any three points** i) G is defined as **(H-TS)** where H and S are the enthalpy and entropy of the system respectively. T = temperature. Since H and S are state functions, G is a **state function.** ii) G is an **extensive property** while $\Delta G = (G_2 - G_1)$ which is the free energy change between the initial (1) and final (2) states of the system becomes the intensive property when mass remains constant between initial and final states (or) when the system is a closed system. iii) G has a **single value for the thermodynamic state of the system.** iv) G and ΔG values correspond to the system only. There are three cases of ΔG in predicting the nature of the process. When, **ΔG<0 (negative), the process is spontaneous and feasible; ΔG = 0. The process is in equilibrium and ΔG > 0 (positive), the process is nonspontaneous and not feasible**. v) $\Delta G = \Delta H - T\Delta S$. But according to I law of thermodynamics, $\Delta H = \Delta E + P\Delta V$ and $\Delta E = q - w$. $\Delta G = q - w + P\Delta V - T\Delta S$ But $\Delta S = q/T$ and $T\Delta S = q$ = heat involved in the process. $\Delta G = q - w + P\Delta V - q = -w + PV$ (or) **$-\Delta G = w - P\Delta V$ = network.** The decrease in free energy –ΔG, accompanying a process taking place at constant temperature and pressure is equal to the maximum obtainable work from the system other than work of expansion. This quantity is called as the "net work" of the system and it is equal to $(w - P\Delta V)$. **Net work = $-\Delta G = w - P\Delta V$.**	3
	(OR) b) (i)The effect of concentration on equivalent conductance can be studied from the plots of λ_C values versus square root of concentration of the electrolyte. By doing so, it has been found that different types of plots are obtained depending on the nature of electrolyte. For strong electrolytes λ_C decreases linearly with increase in $\sqrt{C}$ while for weak electrolytes, there is a curve type of non linear decrease of λ_C with $\sqrt{C}$.  $\lambda_C = \lambda_\infty - (A + B\lambda_\infty)\sqrt{C}$	1 1 1 1
	(ii) $pH = -\log[H^+]$ $= -\log 10^{-2}$ $= +2$	1

37	a) (i) a) Concentrated sulphuric acid being more powerful acid and dehydrating agent removes two molecules of water forming **dioxan.** 	2 (Without catalyst 1)
	b) When glycerol is heated with potassium bisulphate or **conc. sulphuric acid or phosphorous pentoxide** dehydration takes place. Two β-elimination reaction takes place to give acrolein or acrylic aldehyde. 	2 (Without catalyst 1)
	(ii) CH_3CH_2OH is more water soluble than $CH_3CH_2OCH_3$ **Reason :** Presence of H - Bonding in Ethanol	1
	(OR) **b) (i)** $CH_3CH_2-O-CH_2CH_3$ diethyl ether $CH_3-O-CH_2-CH_2-CH_3$ methyl-n-propyl ether $CH_3-O-CH(CH_3)-CH_3$ methyl isopropyl ether	1 1 1
	ii) $C_2H_5OC_2H_5 + 2HI \longrightarrow 2\,C_2H_5I + H_2O$ **Zeisel's method of detection and estimation of alkoxy (especially methoxy) group** in natural products like alkaloids.	1 1
38	a) (i) a)  b) $CH_3NH_2 + CHCl_3 + 3KOH \longrightarrow CH_3NC + 3KCl + 3H_2O$	2 2
	ii) $(CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$	1
	(OR) b) The *propulsion system* in most space vehicles consists of rocket engines powered by chemical propellants. These also called *rocket propellants*. *Propellants are combustible compounds which on ignition undergo rapid combustion to release large quantities of hot gases.* A propellant is a combination of an *oxidiser* and a *fuel*. Working of a propellant : These gases then come out through the nozzle of the rocket motor. Newton's Third law of Motion (to every action, there is an equal and opposite reaction). Hydrazine, Liquid hydrogen,Polyurethane, etc.	1 1 1 1 1

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